

March 11, 2022

Washington State Building Code Council
PO Box 41449
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Dear Council Members:

I want to speak in supportive of the proposed energy code. If implemented in full it would be a significant first step on the path to de-carbonization. I hope you'll give strong consideration to selecting a CMU option, option 2 would be my preference but anything better than the current code would be okay. There's a reason CMU keeps returning. The current requirements for CMU walls make them thermally equivalent to a metal frame window, a component that is limited to 30% of the wall areas. Modeling along with cost estimator costing submitted in other code cycles demonstrated that insulating CMU is cost effective. Regional field studies have found CMU walls are surprisingly common. We are pushing buildings to get all the cost effective efficiency possible. Not requiring them to improve like other items forces other areas of the code to do more. CMU is the only envelope component, HVAC or lighting item that has not improved in the last 12 years, it has actually decreased in efficiency since the 2009 WSEC where zone 2 required CMU walls to have R5 continuous insulation.

CMU option 1 limits the insulation requirement to walls where one of the CMU surfaces is finished which improves cost effectiveness of insulation since a major portion of the cost is finishing the wall. And if the wall is being finished adding insulation will not decrease the surface strength, one of the disadvantages of insulating. A possible third option would be to keep the current exception and eliminate school gyms and storage/retail warehouse from the building type list that can utilize it.

It is time for CMU to be insulated like all other wall types. Installing insulation will provide jobs. This does not ban block walls. They still have the option to comply utilizing component performance or C407, and walls can be anything in low-energy and semi-heated spaces. Only heated spaces would need to comply.

This submission also contains the results of a cover to cover read of the code to locate areas where the code was in ambiguous, unclear, or in error. The items are classified and prioritized, and are mostly not critical. A number of the items are simple issues that staff is likely to be able to correct without deliberation but a number will require Council or TAG deliberation. I have tried to provide suggested language.

Most of the comments are contained in the following table. Given the length of the code there are definitely cases where I have misread code and for sure missed issues. And in some cases I'm not familiar enough with the topic to definitively declare a problem, and can just note that it is

confusing. I recommend that these issues be checked with subject matter experts and the resulting work reviewed.

The issues are categorized by the type of deliberation and priority. The type of deliberation is in the Action column. “Edit” denotes items that likely are remedied by staff without council action. “TAG” denotes items that will likely require council deliberation either within the MVE committee or sending to the TAG to remedy. “Edit / TAG” items are items that which are somewhere in between. The priority column ranges from 1 (high) to 3 (low).

In addition to this submission there are 5 attached files detailing issues and in many cases suggested changes. For Table C404, and Sections C403.3.4, C406, C407, and C411 individual files have been submitted with all the suggested revisions and comments that pertain to that section. These sections involve a large number of detailed changes that in some cases need to be coordinated. These all have high priority.

- The C404 water heater efficiency table has been edited to fix footnote references, add 3 footnotes, and update the Chapter 6 references. These changes came to light during the IECC code process.
- The C403.3.4 section file presents the results of work by Nick O’Neil, the original proponent working with the IECC mechanical subcommittee. It clarifies the code and maintains the original intent.
- The C406 section file presents the results of work by Reid Hart, the original proponent, and I. This file reflects a good faith attempt to clarify the code and maintain the original intent. There is one outstanding issue we could not adequately resolve.
- The C407 section file has a small number of issues with one needing to be coordinated with the C411 changes. This file was reviewed and added to by Mike Rosenberg the original proponent of C407 changes this cycle.
- The C411 section file highlights a number of issues as a result of language oversights and interactions with sections C406 and C407. There is one important choice to be made.

Part of the reasoning for giving the commercial code an extra year before adoption was to allow issues to be found and fixed before adoption. I’m hopeful that the material here is useful in this process.

Mike D Kennedy

Section or Table	Description	Action	Priority
Table C403.3.2	All efficiency tables should be updated with 90.1 releases their tables for public review in June for 90.1-2022. They are doing a careful job and 2024 IECC will adopt those numbers. The WSEC should too.	TAG	1
Table C403.3.2 (6)	NOTE: All boiler values are in contention due to a suit that was filed last fall and ruled on in January. DOE must go back and show better support for these new numbers. Update per the best information available at the last possible date. Current best data would update the < 300000 efficiency numbers to 84% for gas hot ware, 86% for oil hot water, 82% for gas steam, 85% for oil steam.	TAG	1
Table C405.4.2(2)—Interior lighting power allowances—Space-by-space method	Footnote "I" has been applied to the entire Common Space Types table. This is not what was discussed at the TAG (at the end). "I" is also applied to some of the individual categories - this is what was decided on by the TAG. Delete the "I" footnote from the header of the common Space-by-space Types table	EDIT / TAG	1
Table C405.5.3(3) Individual Lighting Power Allowances for Building Exteriors	First row is labeled "Base site allowance". This should say “building façade” not “base site allowance”. There is no base site allowance for this table.	TAG	1
C202 Building thermal envelop	Several issues with this reworked definition. 1) Item 1 talks about separating conditioned space from semi-heated, but semi-heated spaces are included by the definition of conditioned space. 2) Green houses are a separate item in the C402.1.1 title. The use of phrase “low energy space in accordance with Section C402.1.1” would seem to leave out green houses. Needs to be reworked with hopefully some different wording. Ideally much simpler. Perhaps replace 1-3 with" <u>1. Separates conditioned areas of all types from unconditioned or unenclosed areas.</u> <u>2. Separates conditioned areas of differing types including elements between fully conditioned areas, low energy, semi-heated, green house, and refrigerated areas.</u> If not replaced then "green houses" should be added to each of the 1-3 items and a fourth item added for greenhouse.	TAG	2
C202 POWER-OVER-ETHERNET	Definition is not needed and confusing. POE is only used in the code as a variable in Equation 4-13 and the details are covered there and include more than just POE lighting. Delete.	TAG	2

Section or Table	Description	Action	Priority
LIGHTING (POE)			
C202 THERMAL DISTRIBUTION EFFICIENCY (TDE).	<p>Defined as: The resistance to changes in air heat as air is conveyed through a distance of air duct. TDE is a heat loss calculation evaluating <u>calculated as</u> the difference in the heat of the air between the air duct inlet and outlet caused . . . "</p> <p>The statement "TDE is a heat loss calculation" is not correct. It is the result of the calculation. Perhaps, "TDE is calculated as the difference . . ."</p>	TAG	2
C202 Unconditioned Space	<p>Defined as: "An enclosed space within a building that is not a conditioned space, a semi-heated space or a low energy space in accordance with Section C402.1.1 "</p> <p>It is confusing to call out Semi heated and low energy as conditioned space but not mention greenhouses and equipment shelters. Also, the definition of low energy space includes unconditioned space. Consider deleting everything from the first comma on. In anything this detail should be listed as part of conditioned space definition. If kept change to "low energy, semi-heated, or a green house space in accordance with C402.1.1" and maybe even add, "or an equipment building in accordance with C402.1.2"</p>	TAG	2
C202 WATER HEATER	<p>Defined as: "Any heating appliance or equipment that heats potable water and supplies such water to the potable hot water distribution system."</p> <p>This definition is incongruous with the code. The energy code generally refers to service water not potable water. Also, code regulates the efficiency of process water heaters too so this definition is not appropriate as a general term. Probably not needed but if kept needs to be revised maybe by making the defined term more specific.</p>	TAG	2
C401.2 Application	<p>Reads in part: "1. Prescriptive compliance. The prescriptive compliance option requires compliance with Sections C402 through C406, and Sections C408, C409, C410, and C411, <u>and C412</u>"</p> <p>There is now a C412. Add, perhaps reword to C408 through C412, or perhaps better for maintenance change the whole section delineation to "all Sections of this code except C407". Long term it seems like C407 should be the last section and all prescriptive sections grouped together.</p>	TAG	2
C401.2 Application	<p>Reads in part: "When adopted by the local jurisdiction, the requirements of Appendix F, Outcome-Based Energy Budget, Sections C408, C409, C410, C411, <u>C412</u> and any . . ."</p> <p>Add C412</p>	TAG	2
C401.2.1 Application to existing buildings	<p>Reads: "Additions, alterations, repairs and changes of occupancy to existing buildings shall comply with Chapter 5"</p> <p>This leaves out changes of use and conditioning.</p>	TAG	2

Section or Table	Description	Action	Priority
C401.2.2 Application to process equipment.	<p>Reads: "Energy using equipment used by a manufacturing, industrial, or commercial process . . . shall comply with Section C403.3.2, Tables C403.3.2(1) through (16) inclusive, Sections C403.3.4.1 through C403.4.3, C403.7.7, C403.9.2.1, C403.10.3, C403.11.2, C403.11.3, C404.2, Table C404.2, and Sections C405.8, C410, and C412. "</p> <p>The new boiler control sections C403.3.4.1, 2, and 3 should be added to this since they specifically address process equipment. Another alternate to listing three items here and in the mechanical chapter is to limit C403.3.4.4 to "non-process" boilers. C403.3.4.5 is already limited to space heat boilers. Then this could point to C403.3.4.</p>	TAG	2
C402.2.2 Specific building thermal insulation requirements	This is now really confusing. C402.1.3 talks about R-values, C402.1.4 talks about U values and has a bunch of new text related to several components, and C402.2 talks about R-values. The text in C402.1.4 and C402.2 overlap in many places but not always and there seem to be some confusing bits like how to treat under RTU insulation in the u-value table. And even though C402.1.4 has its own sections it still points to C402.2. Ways to fix: move text in C402.2 into C402.1.3 to parallel the text in C402.1.4 or better yet, rewrite the C402 text to be U/R agnostic and delete the new sections in C402.1.4. In most cases a single sentence or clause could address the U-value. Or the R and U table references could be removed totally except where needed.	TAG	2
C402.2.6 Insulation of radiant heating systems	Section titles listed twice and section number incorrect. Delete one of the two titles and fix numbering.	EDIT	2
C402.2.7 Airspaces	Section number is missing	EDIT	2
C402.2.8 Above grade exterior concrete slabs	There is exception for mass transfer decks but they are not exempt. They have to do TBP or C402.1.5. Delete exception.	TAG	2
C402.4.2 Minimum skylight fenestration area	Second sentence of item three should be a new paragraph. It applies to all spaces required to have with skylight and is not part of the criteria of item 3.	EDIT	2
C402.5.2 Enclosure testing for dwelling . . .	<p>Item 3, second para reads: "Where the measured air leakage rate exceeds 0.25 cfm/ft² (2.0 L/s x m²) corrective action shall be taken to seal leaks in the air barrier. Post-corrective action testing and repeated corrective action measures will be taken until the required air leakage rating is achieved. Final passing air leakage test results shall be submitted to the code official. "</p> <p>Should clarify that corrective action needs to occur to the whole building not just the tested units. Maybe: "in all units exceeding code and all untested units"</p>	TAG	2

Section or Table	Description	Action	Priority
C403.1 General	<p>Exception 1 for process reads: "Energy using equipment used by a manufacturing, industrial or commercial process other than for conditioning spaces or maintaining comfort and amenities for the occupants are exempt from all Section C403 subsections except for Section C403.3.2, Tables C403.3.2 (1) through (16) inclusive, Sections C403.3.4.1, C403.3.4.2, C403.3.4.3, C403.7.7, C403.9.2.1, C403.10.3, C403.11.2, and C403.11.3, as applicable. Data center and computer room HVAC equipment is not covered by this exception."</p> <p>This needs to also include new sections C403.3.4.1, C403.3.4.2, and C403.3.4.3 which are designed to impact process boilers. An alternate to listing three items here and in C401 is to limit C403.3.4.4 to "non-process" boilers in the text. C403.3.4.5 is already limited to space heat boilers. Then this could refer to C403.3.4</p>	TAG	2
C403.1.4 Use of electric resistance and fossil fuel-fired HVAC heating equipment	<p>Exception 1, 2nd sentence reads in part: " For the purposes of this exception, overhead or wall-mounted radiant heating panels installed in an unheated or semi-heated space, insulated in compliance with Section C402.2.8 and controlled by occupant sensing devices in compliance with Section C403.11.1 need not be included as part of the HVAC heating energy calculation."</p> <p>Since semi-heated spaces are limited to 8 Btuh/sf and include the capacity of the radiant panels there is no way to have a semiheat space to which the first sentence in the exception doesn't apply. The 2nd sentence covers a case that is impossible, a semi-heat space, with more than 8.5Btu/sf heating. It is not needed and should be deleted.</p> <p>If not deleted then address these issues:</p> <ol style="list-style-type: none"> 1) How can an unheated space have heat? - replace "unheated" with "low energy" 2) "Heating energy calculation" should be "heating capacity calculation" 3) Does a semi-heated space qualify as meeting the interior temperature requirements of chapter 12? Typically this would be in an FHSU occupancy that would meet the requirements by virtue of being excepted within chapter 12. Assuming this is here because the thought is FHSU occupancies do not comply with chapter 12 then this sentence needs to be expanded or better yet turned into a standalone exception. Leading off with "for purposes of this exception" and then discussing only the capacity, leaves the IBC chapter 12 requirement in place. 	TAG	2
C403.1.4 Use of electric resistance and fossil fuel-fired HVAC heating equipment	<p>Exception 2.1. "Corner rooms. A room within a dwelling or sleeping unit that has two primary walls facing different cardinal directions, each with exterior fenestration, is permitted to have an installed HVAC heating capacity no greater than 1000 watts in Climate Zone 4, and 1300 watts in Climate Zone 5. Bay windows and other minor offsets are not considered primary walls. For buildings in locations with exterior design conditions below 4°F (-16°C), an additional 250 watts above that allowed for Climate Zone 5 is permitted."</p>	TAG	3

Section or Table	Description	Action	Priority
	<p>Exception 2 is clearly talking about the unit; all the rooms have to comply for the unit to be exempt. Exception 2.1, being a subsection, might be the same but it is worded like it is always okay heat corner rooms with 750 watts electric resistance when the room complies even if the unit doesn't.</p> <p>Maybe replace 2.0 and 2.1 with: Exception 2. "Dwelling or sleeping units are permitted to be heated using electric resistance appliances as long as the installed HVAC heating capacity in any separate habitable room with exterior fenestration is no greater than: 1: 750 watts in Climate Zone 4, and 1000 watts in Climate Zone 5 in rooms with fenestration 2: 1000 watts in Climate Zone 4, and 1300 watts in Climate Zone 5 for rooms that have two primary walls facing different cardinal directions, each with exterior fenestration, Bay windows and other minor offsets are not considered primary walls.</p> <p>For buildings in locations with exterior design conditions below 4°F (-16°C), an additional 250 watts above that allowed for Climate Zone 5 is permitted in each room with fenestration. Rooms without fenestration are not allowed electric resistance capacity."</p>		
Table C403.3.2 (1),(2)	Minimum efficiency column. Several entries have a before and after 1/1/2013 efficiency. This was discussed in the TAG with the agreement that the before value and dates could be removed. Edit?	EDIT	2
C403.5—Economizers	<p>Exception 6 reads: "Equipment used to cool Controlled Plant Growth Environments provided these are high-efficiency cooling equipment with SEER, EER and, IEER, <u>FL and IPLV</u> values a minimum of 20 percent greater <u>more efficient</u> than the values listed in Tables C403.3.2 (1), <u>(2)</u>, (3), (4), and (((7))) (15)."</p> <p>Why is table 2 not listed as well? Also since table 3 is listed FL or IPLV kW/ton should be listed as metrics. We keep getting into problems for trying to be overly specific. In this case we values lower than the listed kW/ton. Perhaps this should be worded generically: "with rated cooling efficiency 20 percent better than the minimum performance required by Section C403.3.2."</p> <p>We've used</p> <ul style="list-style-type: none"> • Table C403.3.2(1) though C403.2.1(16), and • the tables in Section C403.3.2 <p>Seems like "Section C403.3.2" would be the most direct way to specify all of the tables and it has the advantage of picking up non-standard chillers.</p>	TAG	2
C403.5 Economizers	Exception 9. The table after exception 11 is part of exception 9. In the WSEC 2018 exception 9 was exception 11 – the last exception. I'm not sure why exception 11 became 9 and 9 and 10 were shifted to 10 and 11 but it should be returned to	EDIT / TAG	2

Section or Table	Description	Action	Priority
	the original order OR the table needs to more clearly be tied to exception 9.		
C403.7.1.1 Spaces requiring demand control ventilation	<p>I was the proponent of this change and am having second thoughts about how aggressive and to some extent how complex it is.</p> <p>The primary concern is Section C403.7.1.2 which doesn't properly address small single zone equipment. C403.7.1.2 should be deleted or changed to better handle small single zone equipment required to have dcv by C403.7.1.1 item 1 where a variable speed drive would be required. Needs some sort of size threshold.</p>	TAG	2
C403.7.4.1 Temperature setpoint controls	<p>Item 2 reads: "Unrented and unoccupied guestroom mode shall be initiated within 16 hours of the guestroom being continuously <u>un</u>occupied or where . . ."</p> <p>"continuously occupied" should be "continuously unoccupied"</p>	EDIT / TAG	2
C403.7.5.1 System activation devices for ((enclosed)) loading docks	<p>Reads: "Ventilation systems for enclosed loading docks shall operate continuously during unoccupied hours at 50 percent or less of design capacity . . ."</p> <p>It does not seem right to require loading dock ventilation systems to operate continuously during unoccupied. I can see maybe allowing them to operate then but to require it seems backwards.</p>	TAG	2
Table C403.10.1.2	<p>Row 5, "where located in a building envelope assembly states: "Duct or plenum is separated from building envelope assembly with the minimum insulation value"</p> <p>The code text indicates the Envelope code wall insulation is required between the duct and the exterior and this is between the duct and the building envelope assembly. Not really sure what this means. Why is the highest R value assigned to separate ducts not conveying outdoor air from the space? By definition with the full envelope insulation to the outside this is conditioned space. Also the note mentions plenum but table it not applied to plenums. Maybe it should be?</p> <p>Issue needs to be clarified.</p>	TAG	2
<u>C404.7.3.1 Pipe insulation</u>	<p>Wrong location. This was intended to add insulation to the recirculation loop but is in a section detailing the boiler to storage loop controls. Should be new C404.7.4 Recirculation loop insulation. ..</p> <p>Also, this same provision should probably apply to heat trace systems as well.</p>	TAG	2
C404.11.1 Heaters	Reads in part: "Pool water heaters using electric resistance heating as the primary source of heat are prohibited for pools over 2,000 gallons."	TAG	2

Section or Table	Description	Action	Priority
	So here we are favoring gas over electric resistance but in semi-heat we dropped that preference.		
C405.1 General	<p>Reads in part: "General lighting shall consist of all lighting included when calculating the total connected interior lighting power in accordance with Section C405.4.1 and which does not require specific application controls in accordance with Section C405.2.65."</p> <p>This reads like a definition but the code already has one of those. It doesn't seem like a correct place and it's confusing having two definitions. Also, lighting in the egress path is definitely general lighting by the C202 definition but not by this section.</p> <p>Section reference C405.2.5 should be C405.2.6 and the section title is "Additional lighting controls" though the first sentence is "specific application controls". Hopefully the title of C405.2.6 will be changed to specific application controls (specified in another comment)</p>	EDIT / TAG	2
C405.2.1.5	C405.2.1.4 is gone. Renumber here and in C405.2.1 table	EDIT	2
C405.2.1.6	C405.2.1.4 is gone. Renumber here and in C405.2.1 table	EDIT	2
C405.2.2 Time switch controls	<p>Reads in part: "Each area of the building that is not provided with occupant sensor controls complying with Section C405.2.1.1 shall be provided with time switch controls"</p> <p>Full off controls are required everywhere not just the areas covered by C405.2.1.1. Perhaps reword to: "Each area of the building that is not provided with occupant sensor controls configured to turn the lighting full off shall be provided with time switch control"</p>	TAG	2
<u>C405.2.5.2 Sidelit daylight zone</u>	<p>Item 2 defines the secondary sidelit zone and reads in part: "and longitudinally from the edge of the fenestration to the nearest full height wall or up to 2 feet, whichever is less, as indicated in Figure C405.2.5.2(1)."</p> <p>The primary zone has 0.5 times the window head height rather than 2 feet and this should too. This was error in the initial print of the 2021 IECC. The figure was also in error. See most current 2021 IECC.</p> <p>Rather than "up to 2 feet" it should be "up to 0.5 times the height from the floor to the top of the fenestration".</p>	EDIT / TAG	2
<u>Figure C405.2.5.2(1)</u>	Second figure here indicating 2 ft. is in error it should be 0.5 x H.	EDIT / TAG	2
<u>C405.2.6 Additional lighting controls</u>	Item 5. Exit access. Are these luminaires exempt from all controls or not?	TAG	2

Section or Table	Description	Action	Priority
<u>C405.2.10 Parking garage lighting control</u>	The 1.5 FC exception was eliminated so all garages will need this control even if they have very low light levels. I still don't like the FC limit since it can't be plan checked and would reward a poor design but there could be an LPD limit or a limit on the percent reduction so that lighting would not need to be turned down below 0.05W/SF or some level. IECC discussions convinced me that there needs to be something	TAG	2
C405.4.1 Total connected interior lighting power	Item 12 exempts > 90l/W plant growth TASK lighting from LPD calculation. New plant growth section, C405.3, regulates permanent lighting. Should item 12 here be changed to complying with C405.3 rather than > 90l/W or is task lighting here something else?	TAG	2
Section C405.12— <u>Alternating current-output uninterruptible power supplies (AC-output UPS).</u>	<p>Reads: "AC-output UPS systems serving a computer room shall meet or exceed the calculation and testing efficiency requirements identified in ENERGY STAR Program Requirements for Uninterruptible Power Supplies (UPSs) —Eligibility Criteria Version 2.0—in accordance with the specifications current as of January 1, 2022 or a later edition"</p> <p>I checked with the proponent and the intent and discussion was to require equipment to exceed energy star not the calculations and testing. Replace "calculation and testing requirements" with "efficiency requirements".</p> <p>I also wonder how this will be applied to new equipment in 2026 if energy star moves to Version 3.0. Generally new equipment is not listed on the old lists. Consider "Version 2.0 or newer".</p>	TAG	2
C408.1 General	Exception 2. Odd logic here. Commissioning is exempt where “any” of the following are true which would mean if a building didn’t have a pool would be exempt even if it did have recirculation. I believe the opposite is the intent, where none of these things exist commissioning is not required. Maybe use "does not contain any of the following equipment or systems" and remove the "No" from each item or “where all of the following are true” and keep the "no".	TAG	2
<u>C502-C505 references</u>	There are lots of references to specific sections, many of which are redundant in the sense that they are clearly required. For example, C501.6 is referenced some 20 times. But it is required everywhere since C501 applies everywhere. This implies that all the rest of C501 doesn't apply? I worry about getting the code so specific that any time it is not specifically pointed to it will not apply. Many of these references are not currently correct. All references in this section should be checked	TAG	2
<u>C502.2 Prescriptive compliance</u>	<p>Reads: "Additions shall comply with Sections C502.3 through C502.8"</p> <p>As numbered in the document this should be Section C502.2.1 through C502.2.8. Also, there looks like there is a numbering issue. The document has no C502.2.3. Do C502.2.4-C502.2.8 need to be shifted?</p>	Edit	2
<u>C502.2 Prescriptive</u>	Reads: "Additions shall comply with Sections C502.3 through C502.8"	TAG	2

Section or Table	Description	Action	Priority
<u>compliance</u>	As numbered in the document this should be Section C502.2.1 through C502.2.8 but why not just "this section"? Way less futzing and less error prone. This is becoming spaghetti code which is error prone and hard to read.		
<u>C502.2.X</u>	There needs to be a compressed air section: <u>C502.2.9 Compressed air systems. New and altered compressed air systems and equipment that are installed as a part of the addition shall comply with Sections C412.</u>	TAG	2
C503.1 General	Reads in part: "without requiring unaltered portions of the existing building or building system to comply with this code <u>unless specifically required in this section</u> " This does not jive with the requirement that lpd comply if 20% of the fixtures change. Perhaps add "unless specifically required in this section"	TAG	2
C503.4.3 Alterations or replacement of existing cooling systems (option 2)	Reads in part: "Equipment replacements that include space heating shall also comply with Section C503.4.3". C503.4.3 is Alterations or replacement of existing cooling systems. IMO this needs a couple more sentences to clarify. Does this just mean heat pumps? Does this mean that heating and cooling efficiency need to be better on a package rooftop? Does this mean hydronic unit heater needs an economizer per item 6? Or is this just for when heating equipment is installed on a think like a condenser water loop.	TAG	2
Table C503.4.3 footnote m	Based upon text of footnote this should be "5% lower". But I don't see where footnote m is used. Can it be deleted or is there a footnote missing from the table?	TAG	2
Table C503.4.3 footnote n	The 1.15 in both equations should be 0.85	TAG	2
C503.4.4 Controls for cooling equipment replacement	This requirement in option 1 has more requirements. I do not understand why it is important to option 1 but not option 2. If space heat option 2 selected consider adding the option 1 text for this section.	TAG	2
<u>Table C503.4.6</u>	Items 1 and 2 refer to exception 5d. I think this should be 5.4	EDIT / TAG	2
C503.5 Service (hot) water heating systems option 2	Option 1 contains text that is not in option 2. Is there a reason option 2 doesn't have C408.3, C409.5, and C501.6 called out? Seems like they should be the same	TAG	2
C503.5 Service	The exception list exempts the listed replacement equipment from all compliance. No need to check efficiency. This	TAG	2

Section or Table	Description	Action	Priority
((hot)) water heating systems option 2	<p>should be limited to the new heat pump section. The charging sentence also limits the scope the equipment where the option 1 path is equipment and systems. If option 2 selected this needs to be reworked to require compliance with Table C404.2 and all the systems stuff. Make it a single exception:</p> <p><u>Exception: The following equipment does not need to comply with C404.2.1: . . .</u></p>		
<u>C503.7.3</u> Rewiring and recircuiting	<p>Reads: "Where new wiring is being installed to serve added fixtures and/or fixtures are being relocated to a new circuit, lighting controls shall comply with all applicable requirements in accordance with Sections C405.2.1, C405.2.3, C405.2.4, C405.2.5, C405.2.6, C405.2.7, C405.2.8, C408.4, and C501.6"</p> <p>Not sure why they shouldn't have to comply with C405.2.2 and needs to have C405.2.9 and C405.2.10. Or just say C405.2?</p>	TAG	2
<u>C503.7.5</u> Newly-created rooms.	Link farm should also include C405.2.7 and C405.2.8. But again C405.2 would be fine. The applicant can figure out that exterior lighting and parking garage lighting sections do not apply	TAG	2
<u>C503</u>	<p>There needs to be a compressed air section:</p> <p><u>C503.9 Compressed air systems. New and altered compressed air systems and equipment that are installed as a part of the addition shall comply with Sections C412.</u></p>	TAG	2
<u>C505.4</u>	<p>There needs to be a compressed air section:</p> <p><u>C505.4.7 Compressed air systems. New and altered compressed air systems and equipment that are installed as a part of the addition shall comply with Sections C412.</u></p>	TAG	2
C506.1 Existing buildings that were constructed subject to the requirements of this section	<p>First sentence states: "Where new or replacement systems or equipment are installed in an existing building that was <u>required to install metering during original construction to comply with C409</u>constructed subject to the requirements of this section"</p> <p>New buildings are never subject to this section. Change to "that was required to install metering during original construction to comply with C409" Or perhaps just, where metering systems exist. This same phrasing is used in C506.1.1</p>	TAG	2
C405.1 General	<p>Exception reads: Energy using equipment used by a manufacturing, industrial or commercial process other than maintaining comfort and amenities for the occupants are exempt from all Section C405 subsections except Sections <u>C405.3 and C405.8</u>. Data center and computer room HVAC equipment is not covered+E118 by this exemption.</p> <p>plant growth lighting should probably be added to this as it is not about maintaining comfort or amenities for the occupants</p>	TAG	2

Section or Table	Description	Action	Priority
<u>C502-C505 references</u>	Link to 409.5 is broken. Section C409.5 moved to C506. References to C409.5 occur throughout chapter five and should be updated to C506	Edit	2
C103.1	States: "Construction documents and other supporting data shall be submitted in one or more sets, or in a digital format where allowed by the building official <u>in a format approved by the building official</u> " I assume code officials can choose how materials are submitted including only allowing digital. As worded this would imply that code officials have to accept non-digital formats. If this is needed it should be more general. "in a format approved by the building official"	TAG	3
C202 Floor area, NET	This term is no longer used in code since the increased fenestration for daylighting option was changed from net floor area to gross floor area. Delete	Edit	3
C202 Large-Diameter Ceiling Fan	This definition uses "ceiling fan" which is a defined term. Should be italicized	EDIT / TAG	3
C202 LOW-CARBON DISTRICT ENERGY EXCHANGE SYSTEM	Defined as: Any system serving multiple buildings providing energy in the form of a circulated fluid that can accept or reject heat from individual buildings Is "accept or reject heat from" correct? Seems like it should be "accept heat from or reject heat to" or perhaps worded differently "provides heating or cooling to" individual buildings. The next sentence handles condenser water loops.	TAG	3
C202 LUMINAIRE-LEVEL LIGHTING CONTROL	requires wireless networking. Seems like wired should be included to so secure buildings can do this. Delete word "wireless"	TAG	3
C202 Mechanical room	In general I question the need for this definition, but if it is in here the term "mechanical equipment and appliances" is not defined and not clear especially given that evaporative cooling is not considered mechanical cooling. Add "HVAC"? Does this include electrical equipment, transformer rooms?	TAG	3
C202 Multipass	Multipass is a potentially used in other contexts say in heat exchangers. Defined term should be specific, say: Multi-pass HPWH	TAG	3
C402.1.1.1 Low energy building	Reads in part: ".The following buildings, or enclosed portions thereof, separated from the remainder of the building by building thermal envelope assemblies complying with this code shall be exempt from all thermal envelope provisions of this code" The word provision should be plural	Edit	3
C402.1.1.2 Semi-heated buildings	Reads in part: "Exception: Provided the total installed heating output capacity of mechanical space conditioning does not exceed the criteria for semi-heated space as defined in Section C202, a semi-heated building or space may comply with this	TAG	3

Section or Table	Description	Action	Priority
and spaces	<p>section when served by heat pumps without electric resistance back up and connected to a heating only thermostat. "</p> <p>The "without electric resistance back up" limit no longer makes sense now that the main section allows electric resistance. Should be deleted.</p>		
C402.1.1.3 Greenhouses	<p>In part: "1. Exterior opaque envelope assemblies complying with Sections C402.2 and C402.4.4."</p> <p>Having C402.4.4 (fenestration) here in the section for opaque envelope assemblies is confusing. Does there need to be a distinction between a fenestration in the end wall and the fenestration that make up the main solar aperture? If so, there needs to be some guidance on when fenestration is covered here versus in section 3 on fenestration.</p>	TAG	3
C402.1.1.3 exception to item 3 on fenestration	Current exception is for unheated green house. Unheated and low energy green houses would fall under C402.1.1.1 so this exception is not needed. Suggest deleting or at least changing to Low energy greenhouses. Or is the intent that low energy green houses have to comply?	TAG	3
C402.1.4.1.2 Joints staggered	<p>Reads in part: "Continuous insulation board shall be installed <u>with</u> not less than two layers, and "</p> <p>Change "installed not" to "installed with not" or to "in two or more layers"</p>	Edit	3
Appendix A	In WSEC 2018 the Z furring Table is numbered A105.3.6.1(2) but should be numbered A103.3.6.1(2)	Edit	3
Table C402.1.4 footnote j	Reference to A104.3.7.2 should be A103.3.7.2 based upon 2018 Appendix	Edit	3
C402.2.2 Above grade walls	The sentence "In determining compliance with Table C402.1.4, the use of the U-factor of concrete masonry units with integral insulation shall be permitted. " is confusing. Use for what? It seems like this might be better said as "CMU complying with footnote d can be assumed to meet the Table C402.1.4 for PRESCRIPTIVE compliance"	TAG	3
C402.2.8 Above-grade exterior concrete slabs	It specifies a minimum R10 insulation. This is odd because other sections mostly don't have a value like this and it is inadequate based upon the mass wall requirements for group R. Should be stated to require a thermal break with an R-value meeting the insulation requirements of table C402.1.3, or the u-value of C402.1.4. Or really this should just state that the slab edge is considered to be a mass wall and must comply as a mass wall	Tag	3
C402.2.8 Above grade exterior concrete slabs	The word "exterior" in title really opens up the possibilities when it is an interior slab with exposed edit. I'd delete the word exterior. It is clarified in the actual language	TAG	3
Table C402.4 Building Envelope Fenestration	Table uses word "mulled" which is undefined. Add description of Mulled to footnote a	TAG	3
C402.4.2 Minimum Skylight	<p>Reads: "Skylights shall be provided in enclosed spaces that meet all the following criteria:</p> <p>1. Floor area of enclosed spaces is greater than 2,500 square feet (232 m2).</p>	TAG	3

Section or Table	Description	Action	Priority
fenestration area	Enclosed spaces are stated in the opening sense. Delete "of enclosed spaces" in item 1		
C402.4.2 Minimum skylight fenestration area	<p>Requirements 2.1 and 2.2 do not account for a situation where both skylights and tubular daylight devices are to meet the requirement. Could be reformulated with a single target (1 percent) but then adjust the 0.85 multiplier in the equation for the TDD. It would look like:</p> <p>2. A minimum skylight effective aperture <u>of at least 1 percent</u>, determined in accordance with Equation 4-5 of:</p> <p>SEA = (0.85 x non-TDD area x non-TDD VT x non-TDD WF + 1.31 x TDD area x TDD VT x TDD WF) / toplit daylight zone AREA</p> <p>Term descriptions need to be changed/added Skylight area = Total fenestration area of type (TDD or non-TDD) Skylight VT= Area weights average visible transmittance of type (TDD or non-TDD) TDD = Tubular daylight device non-TDD = All other skylights</p>	Tag	3
C402.4.2 Equation 4-5	"Toplit daylight zone" should be "Toplit daylight zone area"	EDIT / TAG	3
C402.4.4 Doors	Hanging sentence. Intent was probably to end with "vertical fenestration".	EDIT / TAG	3
<u>C402.5.2 Enclosure testing for dwelling . . .</u>	<p>Second sentence of item 2: "For each tested unit that <u>initially</u> exceeds the maximum air leakage rate, an additional two units shall be tested, including a mixture of testing unit types and locations. "</p> <p>This could be ambiguous. Is it units not passing on the first test or the final test? Based upon where it occurs in the text it means the initial test. Insert the word "initially" before exceeds</p>	TAG	3
<u>C403.3.2.4 Water-cooled centrifugal chilling packages.</u>	<p>Reads in part: "Manufacturers shall calculate the FLadj and PLVadj <u>before</u> determining whether"</p> <p>Add space between plvadj and before</p>	Edit	3
Table C403.3.2 (6)	footnote i. Not currently true. If values updated and reference standard set to 90.1-2022 then it will be again but not now	EDIT	3
<u>C403.3.5.1 DOAS with energy</u>	Reads in part: "The DOAS shall include energy recovery. The energy recovery device ventilation system shall have a 68 percent minimum sensible recovery effectiveness of the energy recovery device as calculated . . ."	TAG	3

Section or Table	Description	Action	Priority
recovery ventilation	A mouthful. Maybe replace the beginning of the second sentence with "The energy recovery device shall have a 68 percent minimum sensible recovery effectiveness as calculated . . ."		
C403.4 Equation 4-10	<p>η_m is defined as: "Fan motor efficiency including all motor, drive and other losses for each fan <u>motor</u> in the system"</p> <p>Change second occurrence of "fan" with "motor" or "fan motor" so no one puts in the fan efficiency here</p>	TAG	3
C403.4.1.1 Heat pump supplementary heat	<p>Exception reads: "Packaged terminal heat pumps (PTHPs) of less than 2 tons (24,000 Btu/hr) cooling capacity that have reverse-cycle demand defrost and are configured to operate <u>in the</u> heat pump mode whenever the outdoor air temperatures are above 25°F (-3.9°C) and the unit is not in defrost."</p> <p>Exception requires operation "in heat pump mode". Change to "the heat pump" as heat pump mode is not clear. Consider adding a bit aux electric that operates simultaneously with the heat pump is allowed</p>	TAG	3
C403.4.2.3 Automatic start and stop	<p>Reads in part: Automatic start and stop controls shall be provided for each HVAC system. The automatic start controls shall be configured to automatically adjust the daily start time of the HVAC system in order to bring each space to the desired occupied temperature immediately prior to scheduled occupancy. Automatic stop controls shall be provided for each HVAC system with direct digital control of individual zones.</p> <p>First sentence and 3rd sentence would seem to conflict. Is the third sentence supposed to be applied to multizone systems? I don't get why MZ without DDC should be exempt and would probably drop it but maybe it's work fixing</p>	TAG	3
<u>C403.4.12 Pressure independent control valves</u>	<p>Reads in part: "Where design flow rate of heating water and chiller water coils is 5 gpm "</p> <p>A little bit ambiguous as to whether this is per coil or for all coils. And "chiller" water should probably read "chilled" water.</p> <p>Perhaps reword charging sentence to: "Modulating pressure independent control valves shall be provided for all hydronic heating and cooling coils with a design flow rate greater than or equal to 5gpm."</p>	TAG	3
C403.6.10 High efficiency variable air volume (VAV) systems	<p>Reads: "Allowable Fan power <u>of each fan system</u> shall not exceed 90 percent of the allowable fan power budget as defined by Section C403.8.1.1."</p> <p>The first "Allowable" should be deleted. It is the fan power that shall not exceed the allowable. Also, if the fan system is calculated as two fan systems, supply and return, per the new procedures, this becomes unclear whether each system must be 90% or the sum of the two systems must be 90%. Maybe state "of each system" just after budget</p>	TAG	3
C403.7.6 Energy recovery ventilation	<p>Reads: "Energy recovery ventilation systems shall be provided as specified in either Section C403.7.6.1 <u>and</u> or C403.7.6.2."</p> <p>There is no choice here. "either" should be struck and the "or" should be "and". Or better still. "as specified in this</p>	TAG	3

Section or Table	Description	Action	Priority
systems	section". The subsection references are getting out of control		
<u>C403.7.6.2 Spaces other than Group R-2 dwelling units</u>	<p>The first sentence reads: "Any system serving a space other than a Group R-2 dwelling or sleeping unit, with minimum outside air requirements at design conditions greater than 5,000 cfm or any system where the system's supply airflow rate exceeds the value listed in Tables C403.7.6(1) and C403.7.6(2), based on the climate zone and percentage of outdoor airflow rate at design conditions, shall include an energy recovery system."</p> <p>A bit long for one sentence IMO. As worded the Other than Group R phrase does not apply to the "or any system" clause. At a minimum insert comma after sleeping unit, delete "any system, and delete the comma after C403.7.6(2) since the "based upon . ." stuff is directly applicable to the tables</p>	TAG	3
Table C403.8.1.2 Default Values for Fan kWdesign	<p>This likely seldom used table penalizes fans at the lower end of each range and is long. A 75 HP and 100HP system are calculated respectively as having 1.07 kW/hp and 0.80 kW/hp. There is a little bit of fan motor efficiency difference between the two but not 25%. And generally the lower end of the range would be the more used.</p> <p>Consider making this table be kW/hp and have the user do a multiplication. (Fan kWdesign = Nameplate HP * Default kW/HP). And condense the size ranges since motor efficiency doesn't change all that much.</p> <p>1.5-<=5 5-<=12 12-<=25 25-<=35 35-<=50 60-<=100</p>	TAG	3
C403.8.3 Fan efficiency	Exception 1 uses the word "fans" - should be "fans"	EDIT	3
C403.9.1 Heat rejection equipment	<p>Exception reads: Heat rejection devices where energy usage is included in the equipment efficiency ratings listed in Tables C403.3.2(1), C403.3.2(2), C403.3.2(3), C403.3.2(4), C403.3.2(8), C403.3.2(9), C403.3.2(10) and C403.3.2(16).</p> <p>Seems like this should include all tables with cooling equipment including 12 and 13. Or just say "in the equipment efficiency ratings of cooling equipment listed in Section C403.3.2 exclusive of table C403.3.2(7)". These long table and section lists are really hard to read and error prone. Simplify where possible. Note that 90.1 doesn't bother with this at all and relies on the test standard to determine the applicability</p>	TAG	3
<u>C403.10.1.1 Ducts, shafts, and plenums</u>	Exception is circular. The revised section requires ducts to comply with Table C403.10.1.1 unless they comply with C403.10.1.1.	TAG	3

Section or Table	Description	Action	Priority
	Delete exception!		
C403.10.1.2 Other supply and return ducts	Plenums in section but not title. Add to title?	TAG	3
<u>C403.10.4 Insulation of HVAC system refrigerant piping</u>	<p>Reads: "Field installed HVAC refrigerant piping, other than piping factory installed in HVAC equipment, shall have insulation as listed below, at a conductivity rating of 0.21 to 0.26 Btu × in/(h × ft² × °F) with a mean temperature rating of 75°F. Piping insulation exposed to weather shall be protected from damage, including that due to sunlight, moisture, physical damage and wind, and shall provide shielding from solar radiation that can cause degradation of the material. Adhesive tape shall not be permitted. Manufacturer's required minimum pipe insulation shall be maintained.</p> <p>Then items 1 - 3 are listed"</p> <p>Odd layout with minor technical issue. I would delete the other than piping factory installed in HVAC equipment but could be an exception rather than making for an extra long sentence. Rest could be simplified as well. Reference to insulation "below" is sort of non-standard. It would typically be a table. And we really want to say someone can't install insulation with a lower conductivity? I don't get it.</p> <p>Suggested language: Field installed HVAC refrigerant piping shall be insulated as required by this section. Piping insulation exposed to weather shall be protected from damage, including that due to sunlight, moisture, physical damage and wind, and shall provide shielding from solar radiation that can cause degradation of the material. Adhesive tape shall not be permitted.</p> <p>The insulation shall have a maximum conductivity rating of 0.26 Btu × in/ (h × ft² × °F) at a mean temperature rating of 75°F. The minimum insulation thickness shall be:</p> <p>Then items 1-3</p> <p>Where the manufacturer's required minimum pipe insulation is greater it shall be maintained.</p>	TAG	3
<u>C404.2.1 Service water heating system type</u>	<p>Exception 2 states: " Solar thermal, wastewater heat recovery, other approved waste heat recovery, ground source heat pumps, water-source heat pump systems utilizing waste heat, and combinations thereof, are permitted to offset all or any portion of the required HPWH capacity where such systems comply with this code and the Uniform Plumbing Code."</p> <p>"Water source heat pump systems utilizing waste heat" without some guardrails allows pretty much any heat pump loop</p>	TAG	3
C404.3.2.1 Water	Reads in part: "The volume in the piping shall be determined from the "Volume" column in Table C404.3.1 or from Table	TAG	3

Section or Table	Description	Action	Priority
volume determination	C404.3.2.1." Not sure of the point of this table. People will use whichever is most beneficial. Seems like the C404.3.1 volume column should move to C404.3.2.1 as a column marked other so there is no shopping to find the best default		
C404.11.1 Heaters	Reads in part: "Heat pump pool heaters shall have a minimum COP of 4.0 at 50°F (10°C) db, 44.2°F (6.8°C) wb outdoor air and 80°F (27°C) entering water, determined in accordance with AHRI 1160." This just repeats what is in table C404.2 and could be deleted	TAG	3
C405.2.1.1 Occupant sensor control function	Reads in part: "Occupant sensor controls for the space types listed in <u>required to comply with this section by</u> Section C405.2.1 shall comply with all of the following". The space type list has moved to Table C405.2.1 has many types listed that do not need to comply with this section. To be pedantic one could say something like "in spaces required to comply with this section by Table C405.2.1". Or possibly "by Section C405.2.1". There is a note the material in C405.2.1 of the CR-102 file is not correct. This comment should be reviewed against the correct language.	TAG	3
C405.2.1.2 Occupant sensor control function in warehouse	Item 3 reads:"3. Lights which are not turned off by occupant sensors shall be turned off by time schedule sweep to turn lighting off within 20 minutes of all occupants leaving the space, or comply with Section C405.2.2 to turn lighting off when the building is vacant." What is "time schedule sweep" that is supposed to turn the lighting off within 20 minutes? I think this should read: "Lights which are not turned off by occupant sensors shall be turned off by time switch controls complying with Section C405.2.2 when the building is vacant"	EDIT / TAG	3
C405.2.1.2 Occupant sensor control function in warehouse(New item 5 requires manual control. This is a slippery slope as all lighting requires manual control. Why is it called out only here?	TAG	3
<u>C405.2.4 Light-reduction controls</u>	Exception 2 refers to "special application controls", special should be "specific"	EDIT / TAG	3
<u>C405.2.5 Daylight responsive controls</u>	Nearly every time the primary sidelit, secondary sidelit, or toplit daylight zone is mention it is not followed by "complying with Section C405.2.5.2" or C405.2.5.3 for toplit. These sections merely define where the zones are. The phrase is odd, repetitive, missing in a few places, and sometimes uses "complying" and other times "in accordance with".	TAG	3

Section or Table	Description	Action	Priority
	<p>Suggest changing the charging section and then removing the following from the subsequent subsections: complying with C405.2.5.2, complying with C405.2.5.3, in accordance with C405.2.5.2, in accordance with C405.2.5.3</p> <p>Possible new charging language: "Primary and secondary sidelit zones shall be determined in accordance with C405.2.5.2. Top daylight zones shall be determined in accordance with C405.2.5.3. Daylight responsive controls complying with Section C405.2.5.1 shall be provided to control the general lighting within daylight zones in the following spaces:"</p> <p>If charging sentence not changed then: 1) exception 2 needs a complying with xxx inserted. 2) C405.2.5.3 item 2 needs a complying with xxx inserted 3) Also, there is "complying with" and "in accordance with". C405.2.5.2 and 3 just define the daylighting zone. It would be much clearer English to say "defined by" but in any case it seems like these should be standardized on one term.</p>		
<u>C405.2.6 Additional lighting controls</u>	<p>Reads in part: "C405.2.6 Additional lighting <u>Specific application</u> controls. Specific application lighting shall be provided with controls, in addition to controls required by other sections, for the following:"</p> <p>Title "Additional Lighting controls" was chosen along with the phrase "in addition to controls . . ." to emphasis that these are additional controls. But this section is called specific application controls in all references and in the IECC. Now that item 1 explicitly specifies other controls it doesn't seem like there are other control requirements and the above clarifications become confusing. Title should be changed back to Specific Application controls and ", in addition to controls required by other sections," deleted unless there are other controls.</p>	TAG	3
<u>C405.2.10 Parking garage lighting control</u>	Proposal 21-GP1-127 set these values at 50 percent and 10 minutes but document has the original value 30 percent and 20 minutes	EDIT	3
C405.4.2.1 Building area method	Reads in part: "For each building area type inside the building, ". The word inside is not appropriate since one building area is not inside in the traditional sense. Replace "inside" with "in".	TAG	3
Table C405.4.2(1) Interior Lighting Power Allowances—	Multifamily has been changed to "Multiple family. Multifamily is used in 16 other places in this code. I would revert this to multifamily or change everywhere. Also, I'm unclear why these clarifying footnotes were removed from this table. They seemed very useful. I would undelete them and revise to: "Where dwelling or sleeping units do not comply with C405.1.1 .	TAG	3

Section or Table	Description	Action	Priority
Building Area Method			
C405.4.2.2 Space-by-Space Method	This section that is about the space-by-space method leads off with: "Where a building has a space designated as unfinished, neither the area nor the lighting power in the space shall be calculated as part of the LPA. ". The first sentence should really be about the main section topic not some edge case. This should be moved to the end after item 3.	TAG	3
C405.4.2.2 Space-by-Space Method	<p>Reads in part: "If an entire space has multiple functions that necessitate a higher lighting power allowance in order to serve one of the primary functions, the higher allowance is permitted to be used"</p> <p>The intent of this is common practice but as written will be assumed by some to allow lumping of areas with differing uses that are in a single room. I think this is something that should be deleted but if kept try to reword. Better might be:</p> <p>If there are multiple primary functions for the same space that qualify as different space types, using the type with the higher allowance is permitted. This does not allow adjacent spaces with differing types to be combined.</p>	TAG	3
Table C405.4.2(2) Interior lighting power allowances—Space-by-space method	Footnote c states "additional power shall be" in two places. IMO this should be "additional power allowance shall be"	TAG	3
Table C405.5.3(3) Individual Lighting Power Allowances for Building Exteriors	Consider changing title to distinguish this table from C405.5.3(2). Suggest: Individual Lighting Power Allowances for Specific Exterior Uses	TAG	3
C405.9.2 Escalators and moving walks	<p>Reads: "Escalators and moving walks shall comply with ASME A17.1/CSA B44 and shall have automatic controls that reduce speed as permitted speed in accordance with ASME A17.1/CSA B44 and applicable local code when not conveying passengers."</p> <p>Second occurrence of "speed" should be deleted</p>	EDIT / TAG	3
C408.1 General	Exception 1: refers to energy recovery ventilation (ERV) equipment is less than 300 cfm capacity. Is this clear in terms of supply, exhaust or both. Also, is word capacity needed?	TAG	3
C408.1 General	Exception 2.4 refers to HPWHs that are "fully packaged for individual residential dwelling unit use". I have not heard this	TAG	3

Section or Table	Description	Action	Priority
	<p>term before. Perhaps “with integrated storage tank” or “no heat pump storage water heaters > 6 kW or without integrated storage</p> <p>Integrated heat pump water heaters in commercial are not exempt?</p>		
C409.1 General	<p>Reads in part: "All new buildings and additions shall have the capability of metering all source energy usage in accordance with Section C409.2 in addition to the source energy for on-site renewable energy production in accordance with Section C409.2.4 and the end-use energy usage for electric vehicle charging in accordance with Section C409.3.4"</p> <p>"metering all source energy usage" would be clearer if it were "metering energy usage of each energy source" . And then "in addition to source energy for on-site renewable energy production" would be clearer as "in addition to on-site renewable energy production"</p>	TAG	3
C409.4.3 Energy display	<p>Reads in part: The display shall numerically provide the current energy consumption rate and energy consumption total for each whole building energy source and each end use category. The energy display shall also graphically and numerically display logged data from the data acquisition system for energy consumption and energy consumption rate for each whole building energy source and each end use category for any selected day, week, month, or year.</p> <p>This requires logging of energy consumption rate for each source and enduse category but the meters section only requires consumption rate for electrical meters not for other sources. Is this an issue? Consumption over an hour can be a rate just not the 10 minute variety talked about in meters so maybe this is okay.</p> <p>If not then could edit last two sentences to be Delete “and energy consumption rate”. Add “and electrical energy consumption rate for whole building electrical use and enduses” category</p> <p>for energy consumption and energy consumption rate for each whole building energy source and <u>energy consumption rate for whole building electrical use and each end use</u></p>	TAG	3
Table C410.2	is located before section text. Seems like it should follow	Edit	3
<u>C410.4</u> Refrigerated ((display)) case	Title says "walk-on", should be "walk-in"	Edit	3
C503.3.2 Vertical fenestration	<p>Item 2.1 reads: "Vertical fenestration alternate in accordance with Section C402.<u>4</u>.1.3 for the new vertical fenestration added."</p> <p>Reference C402.1.3 should be C402.4.1.3</p>	EDIT / TAG	3

Section or Table	Description	Action	Priority
<u>C503.4 Building mechanical systems</u>	Reads in part: "Components of existing mechanical systems that are altered or replaced shall comply with Sections C403, C408.2, C409.5, C501.2.2, C501.6 and C503.4.2 through C503.4.5." C409.5 is broken, may C409. All links in this section should be reviewed	TAG	3
C503.4.1 New building mechanical systems	Title is confusing since we refer to new buildings as a specific type of construction. I would revert to "new mechanical systems".	TAG	3
C503.4.3 Alterations or replacement of existing cooling systems	Reads in part: "System alterations or replacement shall comply with Table C503.4.3 when either the individual cooling unit capacity or the building total capacity of all cooling equipment without economizer does not comply with Section C403.3.5 or C403.5" DOAS is no longer uniformly exempt from economizer so this formulation no longer reflects the new building code. This should probably be reframed. Also, I don't see C403.3.5 having capacity limits and even as worded it is awkward in terms of C403.5. I would reframe to something like: "System alterations or replacement shall comply with Table C503.4.3 when either the individual cooling unit capacity or the building total capacity of all cooling equipment without economizer does not comply with exceptions in C403.5", OR better yet: "System alterations or replacement shall comply with Table C503.4.3 when the cooling equipment without economizers does not qualify for exceptions in C403.5." , OR,	TAG	3
C503.4.6.1 Hydronic system alteration supply water temperature.	Reference to C403.3.7.2 should be C403.3.8.2	Edit	3
C503.5 Service ((hot)) water heating systems option 1	link to 409.5 is broken. Section C409.5 moved to C506. References to C409.5 occur throughout chapter five and should be updated to C506	EDIT / TAG	3
C505.1 General	Reads in part: "without requiring the unaltered portion of the existing building to comply with this code <u>unless specifically required in this section</u> "	TAG	3

Section or Table	Description	Action	Priority
	For this section areas that changing (conditioning, occupancy) must totally be brought up to code. One could say if it is undergoing a change of use or conditioning it is altered but I worry that people will claim systems / components inside the space are "the unaltered portion". Perhaps add "unless specifically required in this section".		
C505.1 General	in second sentence of third paragraph "complete" should be "compliance"	Edit	3
<u>C505.2 Change in space conditioning</u>	Item 2 reads: "Any semi-heated space in accordance with Section C402.1.1.2 that is altered to become conditioned space shall be brought into full compliance with this code" Semi-heated space IS conditioned space. Should be "Any semi-heated space where HVAC is added such that the space no longer qualifies as semi-heated space shall be . . ."	TAG	3
<u>C505.4.1 Vertical fenestration</u>	Requires vertical fenestration to comply with C402.4.1. Issue is C402.4.1 includes the alternates C402.4.1.1 and C402.1.1.3. To my reading this allows compliance with that path but doesn't clarify what scope the alternate requirements have to comply with - the project or the building. This may be okay since these are generally large area items but it is a different treatment than in alterations (additions is like this)	TAG	3
C506.1 Existing buildings that were constructed subject to the requirements of this section	Weird title. Why not "Metering in existing buildings"?	TAG	3
C403.1.4 Use of electric resistance and fossil fuel-fired HVAC heating equipment	Exception 2. Does not state what happens to rooms without fenestration. Unit is exempt if rooms with fenestration meet capacity limits. There are no stated capacity limits for unfenestrated rooms. The implication would be that rooms without fenestration can have unlimited heat. This should be clarified. I believe the intent was that rooms without fenestration are not allowed to have electric resistance.	TAG	3
C403.1.4 Use of electric resistance and fossil fuel-fired HVAC	Exception 2. Allows extra 250 W/SF in very cold climates but does not specify whether this is per room or unit.	TAG	3

Section or Table	Description	Action	Priority
heating equipment			